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DETERMINATION OF LOW LEVEL ^{129}I IN BIOLOGICAL SAMPLES USING ACCELERATOR MASS SPECTROMETRY MEASUREMENT*Yanyun Wang¹, Xiaolin Hou^{1, 2}*¹SKLLQG, Shaanxi Key Laboratory of AMS Technology and Application, Xi'an AMS Center, Institute of Earth Environment, CAS, Xi'an 710061, China²Center for Nuclear Technologies, Technical University of Denmark, Risø Campus, Roskilde 4000, Denmark**Keywords:** iodine-129, vegetation, environmental tracer, bioavailability, combustion

Iodine is an important biophilic element, and enriched in human thyroid via the food chains. Environmental ^{129}I , as the only long-lived isotope ($t_{1/2}=1.57\times 10^7$ years), is mainly originated from anthropogenic nuclear activities, and the $^{129}\text{I}/^{127}\text{I}$ ratio in the terrestrial organisms was significantly increased since 1940s. It is important to investigate transfer of radioactive iodine in ecosystem, variation of vegetation and animal samples need to be analysis and to evaluate the radiological impact of radioactive iodine to the environment and population due to nuclear activities. This requires analysing various environmental and biological samples radioactive isotopes of iodine including ^{129}I . Among all possible measurement methods, accelerator mass spectrometry (AMS) is the most sensitive method, and only method for determination ^{129}I in low level environmental samples. Many methods for determination of ^{129}I in soil, sediment and water samples have been reported. While, the method on determination of ^{129}I in biological samples such as vegetation and animal tissues are not well established.

This work aims to develop an effective method for separation of iodine from large size of vegetation samples for AMS measurement of ^{129}I in low level biological samples.

Based on volatility of iodine at high temperature, combustion method using a tube furnace was investigated. Due to the complexity of plant constituents and high organic content, it is critical to burn the sample at a suitable temperature to prevent producing a large amount gas in a short time

and explosion. The results showed that the ignition temperature of most vegetation ranges 220–300 °C. The speed of temperature increase is another key parameter to prevent the rapid burn of sample causing an incompletely combustion, the experimental results showed that at least three hours is needed to ensure a smooth burning of the biological samples. In addition, combustion at a high temperature up to 800 °C and for relative longer combustion time up to 3 hours are needed to completely release iodine from sample. In optimal condition, a recovery of more than 80% for iodine was measured in this step using ^{125}I tracer. The effect of the type of trap solution was also investigated, and found that NaHSO_3 in trap solution does not significantly affect the recovery of iodine, and the optimal concentration of alkali solution is 0.2 mol/L. Iodine in the trap solution is further purified using solvent extraction and prepared as AgI for AMS measurement. Based on this investigation, a method for determination of ^{129}I in different vegetation samples such as lichens, pine needles, grass and, spinach has been established. The overall recoveries of iodine in whole procedure range from 75%–90%. The procedure blanks was also prepared and measured to be $(1-2)\times 10^{-13}$, this is more than 2 orders of magnitude lower than the present environmental level. Compared to alkaline ashing method reported in literature, the developed method is simple, fast, high in chemical recovery and less cross-contamination. This method has been successfully applied to analyse more than 100 vegetation samples collected in north China.

Neutron activation analysis

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DELAYED NEUTRON ACTIVATION ANALYSIS AT ANSTO*Mellodee Anvia, Susan A. Brown*

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Keywords: DNAA, neutron, uranium, activation, nuclear, reactor

Activation analysis techniques including neutron activation analysis (NAA) and delayed neutron activation analysis (DNAA) are sensitive techniques which allow the rapid de-

termination of several elements, including uranium and thorium, down to trace levels. ANSTO Minerals is an international mining consultancy within ANSTO, which provides